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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/938,611	08/27/2001	Tomomi Funayama	212232US2RD	2359

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EXAMINER

CHEN, TIANJIE

ART UNIT PAPER NUMBER

2652

DATE MAILED: 06/09/2004

4

Please find below and/or attached an Office communication concerning this application or proceeding.

7

**Office Action Summary**

Application No.

09/938,611

Applicant(s)

FUNAYAMA ET AL.

Examiner

Tianjie Chen

Art Unit

2652

– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) 9 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

***Non-Final Rejection (RCE)***

***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 02/24/2004 has been entered. Claims 1-10 are pending.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4, 6-8, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nepeta et al (US 6,078,479) in view of Hayashi et al (US 6,490,139).

With regard to claim 1, Nepeta et al shows a magnetic reproducing head in Figs. 1-3 having a magnetic gap G (Fig. 2; column3, line 21) at a medium-facing surface, including a pair of magnetic yokes P2A and P2B of ferromagnetic material (Column 3, lines 19-20), magnetic yoke P2 having a magnetic tip (Fig. 2) at the medium-facing surface and a rear portion recessed from the medium-facing surface and magnetically coupled to the magnetic tip, the magnetic tip having a first width in a track width direction at the medium-facing surface, the rear portion having a second width in the track width direction, and the second width being wider than the first width (Fig. 1), a

Art Unit: 2652

magneto-resistance effect film 19 (Column 3, line 29) recessed from the medium-facing surface (Fig. 1), disposed between the pair of magnetic yokes P2A and P2B, and magnetically coupled to the pair of magnetic yokes of ferromagnetic material, an insulating layer 21 (Column 3, line 36) disposed between each of the pair of magnetic yokes and the magnetoresistive film.

Nepeta et al does not explicitly show a pair of biasing films recessed from the medium-facing surface, the pair of biasing films including a hard magnetic material layer a hard magnetic layer disposed adjacent to the rear portion or an antiferromagnetic material layer disposed in contact with the rear portion.

Hayashi et al shows a magnetic recording head having yokes, magnetoresistive film, and insulating layer, wherein a pair of biasing films 46 (Figs. 16 and 18; column 23, lines 8-9) recessed from the medium-facing surface, the pair of biasing films including a hard magnetic material layer CoCrTa (Column 33, lines 7-8) disposed at B and G adjacent to the rear portion H (Fig. 18; column 24, lines 38-40).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to add the biasing layers taught by Hayashi et al into Nepeta et al's device. The rationale is as follows: Nepeta et al does not explicitly show a pair of biasing layers, but Nepeta teaches that if needed, biasing layer can be provided by soft biasing, permanent magnetic bias or shunt bias means, as is known in the art. Additionally, longitudinal bias can also be provided by antiferromagnetic or permanent magnet bias means (Column 4, lines 41-45). Hayashi teaches by providing bias layer 46 would cause the free layer to have stable magnetic domain (Column 23, lines 59-60) thus reducing Barkhausen noise (Column 1, lines 31-32). One of ordinary skill in

Art Unit: 2652

the art would have been motivated to add the biasing layer to stabilize the domain and reduce Barkhausen noise.

With regard to claim 2, Nepeta et al further shows each of the pair of magnetic yokes of ferromagnetic material comprises a front surface parallel to the medium-facing surface and a rear surface parallel to the medium-facing and front surfaces, and wherein the magneto-resistance effect film has a film surface parallel to the rear surfaces (Fig. 2).

With regard to claim 3, Nepeta et al further shows the magneto resistance effect film is disposed between the pair of magnetic yokes and of ferromagnetic material and recessed from the medium-facing surface.

With regard to claim 4, Nepeta et al further shows the magnetic tip and rear portion comprise a continuously formed ferromagnetic material body.

With regard to claim 6, Nepeta et al further shows a pair of electrodes 20 (Fig. 1; column 4, lines 31-32), but fails to show that one of the pair of electrodes being coupled to a lower film surface of the magneto resistance effect element and another one of the pair of electrodes being coupled to an upper film surface of the magneto resistance effect element .

Hayashi et al shows a pair of conductor 43 and 47 (Fig. 17A), wherein one of the pair of electrodes being coupled to a lower film surface of the magneto resistance effect element 45 and another one of the pair of electrodes being coupled to an upper film surface of the magneto resistance effect element (Fig. 3).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to relocate the conductors as taught by Hayashi et al. The rationale is as follows: Hayashi et al teaches by forming the magnetoresistive film on

Art Unit: 2652

the electrode, current leakage, breaking of the non-magnetic layer, and the like do not occur. As the result, the magneto-resistive element has excellent reliability (Column 3, lines 6-11). One of ordinary skill in the art would have been motivated to relocate the conductors in order to obtain excellent reliability.

With regard to claim 7, Hayashi et al further shows the one of the pair of magnetic biasing films comprises the hard magnetic material layer and the hard magnetic material layer is disposed in contact with a side surface of the rear portion of the magnetic yoke at the interface between B and H (Fig. 18).

With regard to claim 8, Nepeta et al further shows the side surface of the rear portion is tapered (Fig. 1).

With regard to claim 10, as described above, Nepeta et al and Hayashi et al show a magnetic reproducing apparatus for reproducing magnetic information recorded on a magnetic medium, including a magnetic reproducing head having a, magnetic gap at a medium-facing surface, including a pair of magnetic yokes of ferromagnetic material, one of the pair of magnetic yokes having a magnetic tip at the medium-facing surface and a rear portion recessed from the medium-facing surface and magnetically coupled to the magnetic tip, the magnetic tip having a first width in a track width direction at the medium-facing surface, the rear portion having a second width in the track width direction, and the second width being wider than the first width, a magneto resistance effect film recessed from the medium-facing surface, disposed between a pair of magnetic yokes and through an insulating layer and are connected together at area, and magnetically coupled to the pair of magnetic yokes of ferromagnetic material, and a pair of biasing films recessed from the medium-facing

Art Unit: 2652

surface, one of the pair of biasing films including a hard magnetic material layer disposed adjacent to the rear portion.

3. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nepeta et al in view of Hayashi et al as applied to claim 1, and further in view of Sasaki et al (US 6,577,475).

Nepeta et al and Hayashi et al shows a magnetic reproducing head as described above, but does not show magnetic tip is discrete from the rear portion.

Sasaki et al shows a magnetic head wherein a magnetic tip 8b is discrete from the rear portion 8a (Figs. 2A and 6A). It would have been obvious at the time the invention was made to one of ordinary skill in the art to make magnetic tip be discrete from the rear portion. The rationale is as follows: Sasaki et al teaches the step of fabrication is: form the portion 8a first, then flatten the surface, finally tip 8b is finally formed on 8a; and such procedure makes a flat surface for rest portion of 8a (Column 8, line 66 to column 9, line 6). One of ordinary skill in the art would have been motivated by Sasaki et al's teaching to make the tip be discrete from the rear portion, thus obtaining a flat region on the rear portion.

### ***Response to Arguments***

4. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Art Unit: 2652

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tianjie Chen whose telephone number is (703) 305-7499. The examiner can normally be reached on 8:00-4:30, Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa Nguyen can be reached on (703) 305-9687. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
TIANJIE CHEN  
PRIMARY EXAMINER 05/31/04